

HIV transmission risk behaviours among HIV seropositive sexually transmitted infection clinic patients in Cape Town, South Africa

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Background: South Africa has one of the fastest growing HIV epidemics in the world and new infections may often result from people who have tested HIV positive. This study examined the sexual practices and risk behaviours of men and women living with HIV/AIDS being treated for a co-occurring sexually transmitted infection (STI). **Methods:** A sample of men and women receiving services at three South African STI clinics completed a computer administered behavioural assessment. **Results:** Among the 218 HIV positive STI clinic patients, 34 (16%) had engaged in unprotected vaginal or anal intercourse with uninfected or unknown HIV status sex partners in the previous month. A multivariate logistic regression indicated that unprotected sex with uninfected or unknown HIV status partners was independently associated with older age, female gender, alcohol use, and other drug use, and drug use in sexual contexts. **Conclusions:** People living with HIV/AIDS who contract co-occurring STI are at significant risk for transmitting HIV to uninfected partners. Positive prevention interventions are urgently needed for South Africa.

Keywords: HIV/AIDS, HIV infectiousness, positive prevention, sexually transmitted infections.

Introduction

South Africa has among the world's fastest growing HIV/AIDS epidemics and the spread of HIV is amplified by co-occurring sexually transmitted infections (STIs). Co-epidemics of other STI increase uninfected persons' susceptibility for HIV transmission and increase the HIV infectiousness of people living with HIV/AIDS. Specifically, HIV infectiousness is elevated by local migration of HIV infected white cells at the site of inflammation as well as increased HIV viral shedding in the genital tract.¹ In addition, ulcerative STI can cause bleeding, and coital bleeding is associated with increased HIV transmission risk.² The majority of HIV-positive people in southern Africa are unaware of their HIV status and are unknowingly spreading HIV to unsuspecting sex partners.^{3,4} A smaller number of people who know they are HIV-positive maintain HIV transmission risk behaviours with partners who they wrongly assume are also HIV infected or partners whom they are unable to disclose their HIV status because of AIDS stigmas. People living with HIV/AIDS who engage in high-risk behaviours with uninfected sex partners have been deemed a public health priority for HIV prevention interventions.⁵

Research in South Africa has shown that a significant minority of HIV-infected men and women report continued HIV transmission risk practices. Although access to antiretroviral (ARV) therapy has been associated with reductions in sexual risk behaviours in southern Africa, there remains a reservoir of infected persons who continue to engage in unprotected sexual behaviours with uninfected partners.^{5–8} In addition, while HIV treatments may reduce HIV infectiousness by effectively suppressing viral replication, non-adherence to treatment, as well as local inflammation of the genital tract that occurs with STI co-infection negate any

such treatment-related protective benefit.⁹ A meta-analysis of HIV transmission risk factors has shown that a history of genital ulcers in either couple member increases the per-act HIV infectivity >5-fold.¹⁰ There is limited information regarding the co-occurrence of STI in South Africans who know they are HIV infected. In one study of HIV-positive patients receiving wellness clinic services, three out of four were sexually active, with 10% of men and 16% of women experiencing current STI symptoms.⁸ Incident STI increase HIV infectiousness to levels nearly as high as those seen during acute HIV infection.⁹ Unfortunately, little is known about the behavioural characteristics of people living with HIV/AIDS who contract new STI in South Africa.

The purpose of the current study was to examine the behaviours of people diagnosed with HIV infection and receiving STI treatment services from South African STI clinics. We were particularly interested in the continued high-risk sex practices of HIV-infected STI clinic patients because these individuals are at high risk for spreading the virus to uninfected partners. In this study, we focused on people living with HIV/AIDS who had a current STI. In addition, we examined the behaviours of individuals who reported unprotected sex with uninfected partners in comparison with persons who only reported unprotected sex with other HIV-positive partners.

Methods

Participants and settings

The convenience sample in this study consists of 1052 men and 679 women receiving services at three South African STI clinics between February 2006 and April 2009. Potential participants were referred by a nurse clinician to participate in the study that involved completing computerized interviews. The criterion for referral to the study was that the patient was being seen at the clinic for syndrome STI diagnostic or treatment services. Potential participants met with a study recruiter who explained the terms of participation and administered informed consent. Participants were compensated 100 ZAR (~US\$12) for their time and effort to complete the assessment.

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Three STI clinics participated in this research. The first clinic is among the largest STI clinics in Cape Town, a city with a population of over three million. Patients come for services to this clinic from areas throughout metropolitan Cape Town as they are assured greater confidentiality than often afforded at neighbourhood primary health care centres. The clinic sees ~600 STI patients in a typical month. The estimated clinic HIV prevalence is 25% among the ~50% of patients who accept HIV voluntary counselling and testing (VCT). The clinic does not provide specialized HIV treatment services. We recruited 1273 patients from this Cape Town clinic.

The second clinic is located in the Eastern Cape province of South Africa. The Eastern Cape has one of the fastest growing HIV epidemics in the world, with a doubling of HIV infections every 14 months. This clinic is centrally located in a city that has a population of nearly one million people. The clinic provides comprehensive STI diagnostic and treatment services to over 300 STI patients per month from both the city and surrounding rural areas. The HIV prevalence at the clinic is estimated at 20% based on positive HIV tests among patients who accept VCT. The clinic does not provide specialized HIV treatment services. A total of 152 patients were recruited from the Eastern Cape clinic.

The third participating clinic is located in a large township in the East Rand area outside of Johannesburg in Gauteng province. This township has a population of over 250 000. The clinic offers comprehensive health and wellness services, including STI and HIV treatments. The HIV prevalence is ~30% in the STI clinic among patients who agree to receive HIV VCT. We recruited 307 participants from this clinic.

Measures

Measures were adapted from previous research conducted in South Africa. All measures were administered using audio-computer assisted interviews (ACASI) in the languages spoken by nearly all clinic patients, English, Xhosa, Afrikaans and Zulu. Participants viewed assessment items on a 15-inch colour monitor, heard items using headphones and responded by clicking a mouse. Research has shown that ACASI assessment procedures yield reliable responses in sexual behaviour interviews.¹² Participants were instructed to use the mouse and how to respond to questions on the computer prior to the assessment.

Demographic and HIV risk history characteristics

Participants reported demographic information, history of alcohol and other drug use including injection drugs, and history of exchanging sex for money, a place to stay or to meet other survival needs. Men were also asked if they had been circumcised.

Sexual risk and protective behaviours

Participants responded to items assessing their number of male and female sex partners and frequency of sexual behaviours in the previous month; specifically vaginal and anal intercourse with and without condoms. Participants indicated the HIV status of their sex partners as either HIV-positive, HIV-negative or unknown HIV status. A 30-day retrospective recall period was selected because previous research has shown reliable reports for number of partners and sexual events over this time period.¹³ Participants were instructed to think back over the past month and estimate the number of sex partners and number of sexual occasions in which they practiced each behaviour. In addition, we calculated the percentage of intercourse occasions protected

by condoms using the ratio [condom protected vaginal + condom protected anal intercourse/total vaginal + total anal intercourse].

To assess condom use at the event level, participants were asked whether a condom was used by them or their partner the last time they had sexual intercourse. We also asked participants whether they had obtained free condoms from clinics or purchased condoms in the previous month. Responses to these items were dichotomous, Yes or No.

Alcohol and drug use in sexual contexts

Participants reported the number of times that they drank alcohol, defined as beer, wine or other alcoholic beverages before sex in the previous month. The question was repeated separately for non-alcohol drug use before sex. Responses were made using open formats to record continuous frequencies of occurrences over the previous month.

Alcohol and other drug use

Participants completed the Alcohol Use Disorder Identification Test (AUDIT), a 10-item self-report instrument that includes quantity and frequency of alcohol use and was designed to identify individuals for whom the use of alcohol places them at risk for developing drinking problems or who are experiencing alcohol-related problems. AUDIT scores range from 0 to 40, and scores of ≥ 8 suggest alcohol problems. The AUDIT has been used in research in South Africa and is reliable and valid.^{14,15} Participants were also asked whether they had ever used alcohol, dagga (cannabis), cocaine, mandrax and other drugs to determine lifetime use of these substances.

Procedures and data analyses

Participants completed informed consent and an ACASI assessment. As part of the assessment, participants indicated whether they had ever been tested for HIV infection and if so what their most recent HIV test results were. Participants were provided with the option to refuse answering the HIV testing items, a response exercised by only one participant. We used reporting an HIV-positive test result as the selection criteria for the current study and having engaged in unprotected vaginal or anal intercourse with an HIV-negative or unknown HIV status (serodiscordant) sex partner in the previous month as the grouping variable. Comparisons between participants who did not engage in serodiscordant unprotected sex and participants who did engage in this practice were performed using logistic regressions with 95% confidence intervals. All analyses included participants' age and gender as covariates. We conducted a final multivariate model that included all variables from univariate analyses that were significant, $P < 0.05$.

Results

Participants were treated for an array of STI symptoms including genital ulcers ($N = 359$, 21%), genital discharge ($N = 1082$, 62%), and painful urination ($N = 1358$, 78%). The majority ($N = 1635$, 94%) of participants were Black/African and the mean age was 29.6 years ($SD = 7.8$). Five hundred and seventeen (30%) participants were married or living with a sex partner, and 27 of the 1052 men (3%) reported male sex partners. Among the 1732 STI clinic patients, 1479 (85%) had been tested for HIV with 904 (52%) indicating that their latest test result was HIV-negative. In addition, 139 (9%) did not know their HIV test results and one participant refused to

Table 1 Demographic and health characteristics of HIV-positive STI clinic patients who did not and did engage in unprotected sex with HIV-negative/unknown HIV status partners

	No unprotected serodiscordant sex (N = 184)		Unprotected serodiscordant sex (N = 34)		OR	95% CI
	N	%	N	%		
Demographic characteristics						
Men	44	24	6	18		
Women	140	86	28	82	1.4	0.6–3.8
Black	180	98	29	85		
Other race	4	2	5	15	7.7	1.0–30.5
Age (Mean, SD)	30.6	6.7	31.4	8.4	1.0	0.9–1.1
Employed	49	27	12	35	1.6	0.7–4.2
Married	58	32	17	50	1.4	0.8–2.2
Taking ARVs	86	47	20	60	1.6	0.7–3.5
Lifetime HIV risk history ^a						
Injection drugs	2	1	1		N/A	
Sex partner who injected drugs	7	4	3	9	2.2	0.5–9.2
Shared needles	8	4	3	9	2.1	0.5–8.2
Received money for sex	12	7	4	12	1.9	0.3–6.3
Given money for sex	5	2	3	9	3.5	0.8–15.2
Man who had sex with men	1	2	0		N/A	
Circumcised (men)	26	61	1	16	0.2	0.1–1.8
STI symptoms ^a						
Genital ulcer	65	36	15	44	1.4	0.7–3.0
Genital discharge	113	61	26	77	2.3*	1.1–5.5
Condom access and use ^a						
Obtained condoms from a clinic ^b	152	82	30	88	0.9	0.5–2.0
Purchased condoms ^b	72	39	13	38	1.6	0.5–4.8
Used condom last sexual encounter	155	84	24	70	0.4	0.2–1.0

a: Participant age and gender controlled in analyses

b: Past month

* $P < 0.05$, ** $P < 0.01$

provide the result. A total of 218 (12%) STI clinic patients had tested HIV positive.

Among the 218 HIV positive patients, 34 (16%) had engaged in unprotected vaginal or anal intercourse with uninfected or unknown HIV status sex partners in the previous month. Table 1 shows the demographic and HIV risk history characteristics of participants. Results indicated that patients who had engaged in serodiscordant unprotected sex were significantly more likely to be experiencing genital discharge. There were no other significant differences between groups in demographic and risk history characteristics.

Sexual risk and protective behaviours

Table 2 shows the sexual risk and condom use behaviours for HIV positive STI clinic patients who did not and did have unprotected HIV serodiscordant partners. Participants who had unprotected sex with serodiscordant partners reported greater numbers of serodiscordant partners, and had more condom protected sexual behaviours with serodiscordant partners.

HIV-positive STI clinic patients who had unprotected serodiscordant sex also reported more HIV-positive sex partners and greater anal intercourse, both unprotected and protected, as well as less overall seroconcordant condom use than patients who did not have unprotected serodiscordant sex.

Substance use

Participants who engaged in serodiscordant unprotected sex indicated significantly greater substance use, including greater alcohol and other drug use, and greater use of drugs before sex. There were no differences between groups for

problem drinking as indicated by AUDIT scores and there were no differences for drinking before sex (see table 3).

Multivariate analysis

We performed a multivariate logistic regression for non-overlapping variables which were found significant in the analyses reported in tables 1 and 3. Participants' age and gender were included in the model. The multivariate model indicated that older age, female gender, alcohol use, and drug use before sex were significantly independently associated with engaging in unprotected serodiscordant sex when all significant variables were included (see table 4). Genital discharge and cannabis use were no longer significant in the multivariate model.

Conclusions

The current study found that a significant minority of HIV-positive men and women receiving STI clinic services reported recent unprotected sex with known uninfected or unknown HIV status partners. These individuals are at particularly high risk for HIV transmission because co-occurring STI cause viral shedding, local inflammation and genital ulcers which facilitate HIV transmission.^{1,9} Co-occurring STI can complicate HIV infection because some AIDS defining conditions are sexually transmitted such as human herpes virus 8 (HHV8) the cause of Kaposi's Sarcoma, herpes simplex virus (HSV) and cytomegalovirus (CMV) disease. Consistent with other research,^{6–8} we found that HIV-positive STI clinic patients who recently engaged in unprotected sex with serodiscordant partners were not different in taking their HIV treatments. The benefits of HIV treatment for reducing HIV infectiousness are however negated when people with HIV contact STI. The potential

Table 2 Sexual behaviours among HIV-positive STI clinic patients who did not and did engage in unprotected sex with HIV-negative/unknown HIV status partners

	No unprotected serodiscordant sex (N = 184)		Unprotected serodiscordant sex (N = 34)		OR	95% CI
	N	%	N	%		
HIV serodiscordant partners						
Number of partners						
0	115	63	13	38		
1	49	27	13	38		
>2	20	11	8	24	2.0**	1.2–3.1
	Mean	SD	Mean	SD		
Unprotected vaginal intercourse	0		1.5	1.4	N/A	
Unprotected anal intercourse	0		1.4	2.2	N/A	
Protected vaginal intercourse	0.5	1.8	1.3	2.4	1.2*	1.1–1.3
Protected anal intercourse	0.2	1.1	1.3	2.5	1.4**	1.1–1.7
Percent condom use	100	0	30.9	29.5	N/A	
HIV positive (seroconcordant) partners						
Number of partners						
0	143	78	21	62		
1	36	20	11	32		
>2	5	3	2	6	1.9*	1.0–3.4
	Mean	SD	Mean	SD		
Unprotected vaginal intercourse	0.4	2.2	0.9	0.9	1.1	0.9–1.2
Unprotected anal intercourse	0.1	0.2	1.1	2.5	10.3**	3.5–30.7
Protected vaginal intercourse	1.3	4.9	1.3	2.1	1.0	0.9–1.1
Protected anal intercourse	0.1	0.6	1.0	2.0	1.9**	1.2–2.9
Percent condom use	75.1	37.8	44.0	36.4	0.2**	0.4–0.5

Analyses controlled for participant age and gender; N/A not analyzable

* $P < 0.05$, ** $P < 0.01$ **Table 3** Substance use among HIV-positive STI clinic patients who did not and did report unprotected sex with HIV negative/unknown HIV status partners

	No unprotected serodiscordant sex (N = 184)		Unprotected Serodiscordant Sex (N = 34)		OR	95% CI
	N	%	N	%		
Alcohol use ^a	57	31	15	44	2.0*	1.1–3.7
AUDIT problem drinking	65	36	13	38	1.2	0.6–2.4
AUDIT Score (Mean, SD)	6.6	8.8	7.8	10.3	1.0	0.9–1.1
Alcohol use before sex ^a	31	26	12	36	2.1	0.9–5.0
Drug use ^a	15	8	6	18	3.6*	1.9–11.5
Cannabis use ^a	10	5	5	15	4.7**	1.2–17.9
Methamphetamine Use ^a	2	1	1	2	2.6	0.2–29.5
Drug use before sex ^a	7	6	7	21	8.5**	2.1–33.2

a: Past month; analyses controlled for participant age and gender

* $P < 0.05$, ** $P < 0.01$ **Table 4** Multivariate analysis of factors associated with unprotected sex with HIV serodiscordant partners

Variable	OR	95% CI
Age	1.1*	1.0–1.2
Gender	5.9**	1.5–23.5
Genital discharge	1.6	0.6–3.8
Alcohol use	2.5*	1.0–6.5
Cannabis use	0.6	0.1–4.5
Drug use before sex	10.4**	1.7–62.4

* $P < 0.05$, ** $P < 0.01$

for HIV treatment resistant strains to spread among people with HIV and other STI has serious public health implications that require targeted behavioural interventions.¹⁶

Our findings should be considered in light of the methodological limitations of this study. This research was conducted in three STI clinics in three different regions of South Africa. Although the geographic representation exceeds what we would expect from a single clinic study, the convenience samples in each clinic cannot be considered representative of STI clinic patients in South Africa. In addition, our sample was heavily weighted by patients drawn from one clinic in Cape Town, further limiting the generalizability of the sample. In addition, we relied on self-report for behavioural assessments. Our behavioural measures are subject to self-report biases and therefore represent lower-bound estimates of sexual risk and substance use behaviours. Our study was also cross-sectional in design and therefore precludes drawing directional or causal conclusions. With these limitations in mind, we believe that our findings have

important implications for HIV prevention and future research.

Our results show that many of the same factors associated with initial HIV transmission risks, such as alcohol and other drug use, and low rates of condom use persist in predicting continued high risk for HIV transmission. In addition, controlling for potential confounds, women were significantly more likely to engage in unprotected serodiscordant sex than men. Interventions designed to reduce HIV transmission risk behaviours among people already infected with HIV may therefore draw from existing HIV prevention approaches. For example, substance use in the context of sex is effectively addressed by behavioural skills building for managing risk producing situations.¹⁷ Condom skills can also lead to increased condom use and reduce HIV and STI transmission.¹⁸ Although skill building approaches used for uninfected persons will require contextualizing for people with HIV, the fundamental basis of behavioural skills building does not require reinvention.^{19,20} Substance use before sex will likely interfere with condom use and should be directly addressed in condom skills training for people living with HIV/AIDS. Positive prevention interventions will also require attention to the unique challenges facing people infected with HIV who engage in transmission risk behaviours, particularly navigating HIV status disclosure to sex partners and negotiating safer sex in stigmatizing environments. Our findings also show that positive prevention interventions should be directed to individuals who are not receiving HIV treatment as well as those who are receiving treatment. Research is needed to identify the optimal approaches for reducing HIV transmission risks among people living with HIV/AIDS in South Africa.

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Key points

- People living with HIV/AIDS who contract sexually transmitted infections are at high risk for HIV transmission to uninfected partners.
- Among South African HIV-positive sexually transmitted infection clinic patients, 16% report engaging in unprotected intercourse with a uninfected partner in the previous month.
- Unprotected sex with uninfected partners was independently associated with older age, female gender, alcohol use and other drug use in sexual contexts.
- Positive prevention interventions are urgently needed for South Africa.

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